

## CLAIMS

We claim:

1. A water-based composition for decontamination of chemical or biological warfare agents comprising:

one or more monopersulfate compounds;

one or more carbonate-type buffers; and

one or more ketones.

2. The water-based composition of claim 1, wherein at least one of the monopersulfate compounds is an alkali metal salt form of monopersulfate.

3. The water-based composition of claim 2, wherein upon formulation of the composition at least one of the ketones enhances reactivity towards substrates or creates a dioxirane species in the composition.

4. The water-based composition of claim 2, wherein

at least one of the monopersulfate compounds is selected from the group consisting of alkali metal salt forms of peroxymonosulfuric acid alone or in combination with the alkali metal salts of sulfuric or persulfuric acid;

at least one of the carbonate-type buffers is selected from the group consisting of alkali metal salt forms of bicarbonate and/or carbonate; and

at least one of the ketones is selected from the group consisting of one or more of acetone, 2-butanone, 2-pentanone, 2-hydroxy-4-methyl-2-pentanone, hexafluoroacetone, trifluoroacetone, acetophenone, camphorsulfonic acid, and levulinic acid.

5. The water-based composition of claims 1, 2, 3 or 4, wherein the monopersulfate compound(s) are present in a concentration range of about 0.1-40% w/v; the carbonate-type buffer(s) are present in a concentration range of about 0.05-20% w/v; and the ketone(s) are present in a concentration range of about 0.1-40% v/v.
6. The water-based composition of claims 1, 2, 3 or 4, wherein the monopersulfate compound(s) are present in a concentration range of about 1-20% w/v; the carbonate-type buffer(s) are present in a concentration range of about 0.05-20% w/v; and the ketone(s) are present in a concentration range of about 0.1-20% v/v.
7. The water-based composition of claims 1, 2, 3 or 4, wherein the composition has a pH range between about 5 to about 9.
8. A water-based composition for decontamination of chemical or biological warfare agents comprising:
  - one or more monopersulfate compounds;
  - one or more carbonate-type buffers;
  - one or more ketones;
  - one or more co-solvents; and
  - one or more surfactant.
9. The water-based composition of claim 8, wherein at least one of the monopersulfate compounds is an alkali metal salt form of monopersulfate.
10. The water-based composition of claim 9, wherein upon formulation of the composition at least one of the ketones enhances reactivity towards substrates or creates a dioxirane species in the composition.

**11.** The water-based composition of claim 9, wherein

at least one of the monopersulfate compounds is selected from the group consisting of alkali metal salt forms of peroxymonosulfuric acid alone or in combination with the alkali metal salts of sulfuric or persulfuric acid;

at least one of the carbonate-type buffers is selected from the group consisting of alkali metal salt forms of bicarbonate and/or carbonate;

at least one of the ketones is selected from the group consisting of one or more of acetone, 2-butanone, 2-pentanone, 2-hydroxy-4-methyl-2-pentanone, hexafluoroacetone, trifluoroacetone, acetophenone, camphorsulfonic acid, and levulinic acid;

at least one of the co-solvents is selected from the group consisting of acetonitrile, *tert*-butanol, propylene carbonate, propylene glycol, polypropylene glycol; and

at least one of the surfactants is selected from the group consisting of tetrabutylammonium hydrogen sulfate (TBAHS), cetyltrimethylammonium (CTMA) chloride, and/or Triton-X.

**12.** The water-based composition of claims 8, 9, 10 or 11, wherein the monopersulfate compound(s) are present in a concentration range of about 0.1-40% w/v; the carbonate-type buffer(s) are present in a concentration range of about 0.05-20% w/v; the ketone(s) are present in a concentration range of about 0.1-40% v/v; the co-solvent(s) are present in a concentration range of about 0.01-40% v/v; the surfactant(s) are present in a concentration range of about 0.01-15% w/v.

**13.** The water-based composition of claims 8, 9, 10 or 11, wherein the monopersulfate compound(s) are present in a concentration range of about 1-20% w/v; the carbonate-type buffer(s) are present in a concentration range of about 0.05-20% w/v; the ketone(s) are present in a concentration range of about 0.1-20% v/v; the co-solvent(s) are present in a concentration range of about 0.5-20% v/v; and the surfactant(s) are present in a concentration range of about 0.01-5% w/v.

**14.** The water-based composition of claims 8, 9, 10 or 11, wherein the composition has a pH between about 5 to about 9.

**15.** A water-based composition for decontaminating chemical warfare blister and nerve agents comprising:

one or more monopersulfate compounds selected from the group consisting of alkali metal salt forms of peroxymonosulfuric acid alone or in combination with the alkali metal salts of sulfuric or persulfuric acid;

one or more carbonate-type buffer selected from the group consisting of alkali metal salt forms of bicarbonate and/or carbonate; and

one or more ketone selected from the group consisting of one or more of acetone, 2-butanone, 2-pentanone, 2-hydroxy-4-methyl-2-pentanone, hexafluoroacetone, trifluoroacetone, acetophenone, camphorsulfonic acid, and levulinic acid.

**16.** A water-based composition for decontaminating viral, bacterial, fungus, toxins, and spore forming biological agents, comprising:

one or more monopersulfate compounds selected from the group consisting of alkali metal salt forms of peroxymonosulfuric acid alone or in combination with the alkali metal salts of sulfuric or persulfuric acid;

one or more carbonate-type buffer selected from the group consisting of alkali metal salt forms of bicarbonate and/or carbonate; and

one or more ketone selected from the group consisting of one or more of acetone, 2-butanone, 2-pentanone, 2-hydroxy-4-methyl-2-pentanone, hexafluoroacetone, trifluoroacetone, acetophenone, camphorsulfonic acid, and levulinic acid.

**17.** The water-based composition of claims 15 or 16, wherein the composition has a pH between about 5 to about 9.

**18.** The water-based composition of claims 15 or 16, wherein the monopersulfate compound(s) are present in a concentration range of about 0.1-40% w/v; the carbonate-type buffer(s) are present in a concentration range of about 0.05-20% w/v; and the ketone(s) are present in a concentration range of about 0.1-40% v/v.

**19.** The water-based composition of claims 15 or 16, wherein the monopersulfate compound(s) are present in a concentration range of about 1-20% w/v; the carbonate-type buffer(s) are present in a concentration range of about 0.05-20% w/v; and the ketone(s) are present in a concentration range of about 0.1-20% v/v.

**20.** The water-based composition of claims 15 or 16, further comprising

one or more co-solvents selected from the group consisting of acetonitrile, *tert*-butanol, propylene carbonate, propylene glycol, polypropylene glycol; and

one or more surfactants selected from the group consisting of tetrabutylammonium hydrogen sulfate (TBAHS), cetyltrimethylammonium (CTMA) chloride, and/or Triton-X.

**21.** The water-based composition of claim 20, wherein the composition has a pH between about 5 to about 9.

**22.** The water-based composition of claim 20, wherein the monopersulfate compound(s) are present in a concentration range of about 0.1-40% w/v; the carbonate-type buffer(s) are present in a concentration range of about 0.05-20% w/v; the ketone(s) are present in a concentration range of about 0.1-40% v/v; the co-solvent(s) are present in a concentration range of about 0.01-40% v/v; the surfactant(s) are present in a concentration range of about 0.01-15% w/v.

**23.** The water-based composition of claim 20, wherein the monopersulfate compound(s) are present in a concentration range of about 1-20% w/v; the carbonate-type buffer(s) are present in a concentration range of about 0.05-20% w/v; the ketone(s) are present in a concentration range of about 0.1-20% v/v; the co-solvent(s) are present in a concentration range of about 0.5-20% v/v; and the surfactant(s) are present in a concentration range of 0.01-5% w/v.

**24.** A method for preparing said composition as in claims 1, 2, 3, 4, 15 or 16 comprising the steps of

preparing a first water-based solution comprising the carbonate-type buffer(s) and the monopersulfate compound(s);

mixing the ketones with said first water-based solution to form a second water-based solution; and

contacting said second water-based solution with materials contaminated by chemical or biological warfare agent(s).

**25.** A method for preparing said composition as in claims 8, 9, 10 or 11, comprising the steps of

preparing a first water-based solution comprising the carbonate-type buffer(s), the monopersulfate compound(s), the co-solvent(s), and the surfactant(s);

mixing the ketone(s) with said first water-based solution to form a second water-based solution; and

contacting said second water-based solution with materials contaminated by chemical or biological warfare agent(s).

**26.** A method for preparing said composition as in claim 20, comprising the steps of

preparing a first water-based solution comprising the carbonate-type buffer(s), the monopersulfate compound(s), the co-solvent(s), and the surfactant(s);

mixing the ketone(s) with said first water-based solution to form a second water-based solution; and

contacting said second water-based solution with materials contaminated by chemical or biological warfare agent(s).

**27.** A method for preparing said composition as in claims 8, 9, 10 or 11, comprising the steps of

preparing a first water-based solution comprising the carbonate-type buffer(s) and the monopersulfate compound(s);

mixing the ketone(s) with said first water-based solution to form a second water-based solution;

mixing the co-solvents and the surfactants to the second water-based solution; and

contacting said second water-based solution with materials contaminated by chemical or biological warfare agent(s).

**28.** A method for preparing said composition as in claim 20, comprising the steps of

preparing a first water-based solution comprising the carbonate-type buffer(s) and the monopersulfate compound(s);

mixing the ketone(s) with said first water-based solution to form a second water-based solution;

mixing the co-solvent(s) and surfactant(s) to the second water-based solution; and

contacting said second water-based solution with materials contaminated by chemical or biological warfare agent(s).